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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/029,144	12/28/2001	Hye Young Kim	2658-0275P	5231

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EXAMINER	
QI, ZHI QIANG	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/029,144	KIM ET AL.	
	Examiner	Art Unit	
	Mike Qi	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,5-13 and 15-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5-13 and 15-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3, 6-13, 15-18, 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,001,539 (Lyu et al) in view of US 5,135,581 (Tran et al), US 5,628,933 (Carter et al), and US 6,433,842 (Kaneko et al).

Claims 1, 3 and 13, Lyu discloses (col.1, lines 20-67; Fig. 2) that forming method of an LCD comprising:

- a substrate (11);
- a switching device (TFT) for driving the pixel electrode over the substrate (11);
- depositing a protective film (passivation layer 15 and 10) over the substrate (11) to cover the switching device;
- defining a contact hole in the protective film (15,10) to expose the drain electrode (34) of the switching device;
- forming pixel electrode (12) to connect the drain electrode (34) via the contact hole.

Lyn does not explicitly disclose that the pixel electrode is formed by placing

the substrate in a vacuum chamber and injecting hydrogen-containing gas at a temperature of less than 400 °C, and the substrate has a temperature of less than about 200 °C when forming the pixel electrode, and the pixel electrode has an amorphous structure..

However, Tran discloses (col.2, line 20 - col.4, line 58) forming an electrically conductive oxide composition used as a light transmissive electrode in a device, such as liquid crystal displays, by sputtering at temperature from 20 °C to 300 °C (less than Applicant's claimed range of 400 °C) with stabilizing gas such as H_2 or H_2O (hydrogen-containing gas), and preferably, the sputter depositing occurs at temperature of from 25 °C to 150 °C.

Tran also discloses (col.2, line 64 – col.3, line 6) that a room temperature process allows liquid crystal display to be prepared on a supports (substrate) which would otherwise be damaged by high temperature processes (preventing the damage by high temperature processes).

The depositing includes conductive electrodes depositing on a substrate, so that the substrate has a temperature less than 200 °C according to the room temperature process. The pixel electrode also is a conductive electrode. The forming process for a conductive electrode is also suitable for the pixel electrode in order to prevent the damage by high temperature processes.

As an evidence, Cater discloses (col. 1, lines 31-41; col.4, lines 16-38) that a transparent conductor forming method (deposition process) in which the substrate in a vacuum chamber was heated to 250 °C, and after growth of several thousand

angstroms, the chamber was again evacuated and the substrate was permitted to cool to room temperature (i.e., less than 200 °C), and the film subsequently removed from the chamber has good electrical conductivity. According to the specification of the paragraph 0035 of this application, the depositing process allows the substrate temperature to be less than about 200 °C. Therefore, the substrate in the deposition process was also permitted to a cool temperature to be less than 200 °C, and the reference Cater reads this process in which the substrate was permitted to room temperature (less than 200 °C).

Concerning the limitation of placing the substrate in a vacuum chamber, Cater discloses (col.4, lines 16-38) that placing the substrate in a vacuum chamber, and the LCD forming process uses a vacuum chamber, and that is a conventional.

Still lacking limitation is such that the pixel electrode has an amorphous structure, and the pixel electrode is etched with a weak acid etchant.

However, Kaneko discloses (col.5, lines 47 – 51) that the amorphous indium tin oxide (ITO) or indium zinc oxide (IZO) is preferably used as the material of the pixel electrodes, because the amorphous structure allows for use of a weak acid etchant, so that the aluminum alloy is prevented from being damaged during etching of the pixel electrodes. Kaneko also discloses (col.9, lines 7 – 43) that by using the weak acid, the layered structure (such as gate electrode) underlying the ITO film is secured from being damaged during the etching of the ITO film.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to use a forming process such as injecting hydrogen-containing gas

at a temperature less than 400 °C and the substrate has a temperature of less than 200 °C as claimed in claims 1, 3 and 13 for preventing the damage by high temperature processes as taught by reference Tran, and obtaining good electrical conductivity, and securing the electrodes underlying the pixel electrodes from being damaged during the etching of the ITO film as taught by reference Kaneko.

Claims 22 and 23, lacking limitation is such that the temperature of the substrate corresponding to half a set temperature of the vacuum chamber.

However, Tran discloses (col.2, line 20 - col.4, line 58) forming an electrically conductive oxide composition used as a light transmissive electrode in a device, such as liquid crystal displays, by sputtering at temperature from 20 °C to 300 °C (less than Applicant's claimed range of 400 °C) with stabilizing gas such as H_2 or H_2O (hydrogen-containing gas), and preferably, the sputter depositing occurs at temperature of from 25 °C to 150 °C.

Tran also discloses (col.2, line 64 – col.3, line 6) that a room temperature process allows liquid crystal display to be prepared on a supports (substrate) which would otherwise be damaged by high temperature processes (preventing the damage by high temperature processes).

Therefore, the temperature of the substrate that is less than 200°C according to the room temperature process, such as 25°C, and the temperature of the vacuum chamber sputtering with stabilizing gas such as H_2 or H_2O (hydrogen-containing gas), preferably, the sputter depositing occurs at temperature of from 25 °C to 150 °C (less

than 400°C such as 50°C. Such that the temperature of the substrate corresponding to half a set temperature of the vacuum chamber.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made for pixel electrode forming process wherein the temperature of the substrate corresponding to half a set temperature of the vacuum chamber as claimed in claims 22 and 23 for preventing the damage by high temperature processes.

Claims 6 and 15, Lyu discloses (col.1, lines 20-67; Fig. 2) that forming a gate electrode (23) over the substrate (11); entirely depositing a gate insulating film (21) over the substrate (11) to cover the gate electrode (23); and continuously depositing a semiconductor layer (22) as active layer and an ohmic contact layer (33) to overlap the gate electrode (23).

Claims 7-9 and 16, Lyu discloses (col.1, lines 20-67; Fig. 2) that the passivation layer (15,10) is made from an inorganic insulating material such as silicon nitride, silicon oxide, etc., or an organic insulating material.

Claims 10-11 and 17, Lyu discloses (col.1, lines 20-67; Fig. 2) that the pixel electrode (12) is formed from the transparent conductive material such as indium tin oxide (ITO).

Claims 12 and 18, Lyu discloses (col.1, lines 20-67; Fig. 2) that the source and drain electrodes (24,34) of the switching device is made of Mo.

Claims 20 and 21 are redundant. Because the claims 1 and 13 already have such limitations such as the substrate has a temperature of less than about 200°C, and

the 200°C temperature is a half of the 400°C temperature (also see the explanation of Tran, Cater and Kaijou above).

3. Claims 5 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyu, Tran, Cater and Kaneko as applied to claims 1, 3, 5-13, 15-18, 20-23 above, and further in view of US 5,972,527 (Kaijou et al).

Claims 5 and 19, lacking limitation is such that the substrate has a temperature between about 50 °C and about 150 °C when forming the pixel electrode.

However, Kaijou discloses (col.1, line 66- col.2, line 45; col.6, line 48 – col.11, line 57) that a sputtering method for producing a conductive layer in which the substrate temperature is preferably between room temperature and 200°C (col.11, lines 47-56) (the ranges of 50 °C to 150 °C overlap the ranges of 25 °C to 200°C), and the conductive layer having excellent electrical conductivity by such sputtering method (col.2, lines 40-45); and in the case where the claimed ranges "overlap ranges disclosed by the prior art" a prima facie case of obviousness exists (see MPEP 2144.05. I.).

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to use a temperature between about 50 °C and about 150 °C when forming the pixel electrode as claimed in claims 5 and 19 for achieving the excellent electrical conductivity.

Response to Arguments

4. Applicant's arguments filed on Jan.10, 2005 have been fully considered but they are not persuasive.

Applicant's arguments are as follows:

1) The references do not disclose that the temperature of substrate is about half of the 400°C set point of the vacuum chamber.

Examiner's responses to Applicant's arguments are as follows:

1) In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., The claims described that the temperature of the substrate is less than about 200°C, and the temperature of injecting hydrogen-containing gas in a vacuum chamber is less than 400°C. Such that the claims do not definitely describe that the temperature of substrate is about 200°C and the temperature of the vacuum chamber is set point of 400°C.) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1) As an evidence, US 6,466,293 (Suzuki et al) discloses (col.19, line 43 – col.20, line 32) that a LCD forming process in which the substrates precisely superposed and adhered and then were placed in a vacuum chamber.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (571) 272-2299. The examiner can normally be reached on M-T 8:00 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Qi
March 14, 2005

TARIFUR R. CHOWDHURY
PRIMARY EXAMINER